NWQMC NATIONAL WATER QUALITY MONITORING COUNCIL

Methods and Data Comparability Board

Update on the National Environmental Methods Index (NEMI)

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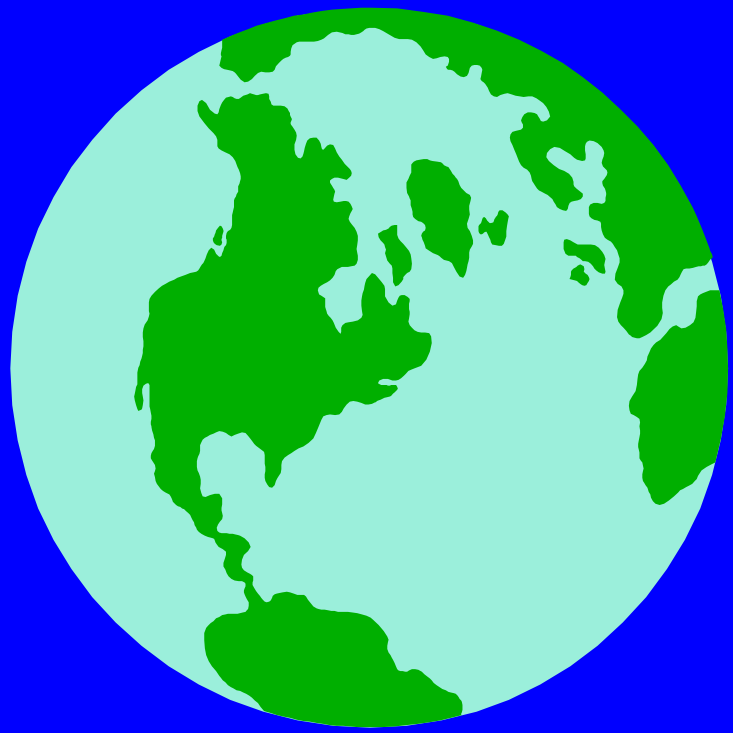
Advisory Committee on Water Information
Reston, VA
May 15, 2001

The ACWI endorses the continued development and timely delivery of NEMI as a vital tool to enhance the generation of comparable data of known quality, across all entities that conduct water quality monitoring. Use of NEMI will assist in the design of water quality monitoring programs, so that data quality objectives and measurement quality objectives are more readily achieved.

Endorsement on May 16, 2001

National Environmental Methods Index



Mission

"To allow rapid communication and comparison of critical parameters of methods for use with methods selection and/or methods modifications and data comparability"

What We'll Cover Today

- **Why NEMI is Being Developed**
  - ✓ **Reasons**
  - ✓ **Benefits**
- **What NEMI is**
  - ✓ **How NEMI is Being Developed**
  - ✓ **Information Sources NEMI Uses**
  - ✓ **Characteristics of the Program**
  - ✓ **How NEMI is Used - With Examples**
- **Future Enhancements**

The Reasons for NEMI

- **Significant resources are expended annually to collect water quality data.**
  - ✓ Water quality data is collected by numerous agencies and by varying methodologies.
  - ✓ To allow data collected by one agency to be used by other agencies we need to compare and recommend methods that facilitate collaboration and yield **comparable** data and assessment results.
  - ✓ It is difficult to compare the advantages and disadvantages of one method with another using full method texts since they may typically range from 30 to 90 pages in length and have different formats.

The Benefits of NEMI

- ✓ User-friendly database searchable over the Internet, will enable users nationwide to obtain methods information with only a standard Internet connection and browser.
- ✓ No special equipment or sophisticated software is needed to access the information.
- ✓ Future updates to the database can be done centrally.

NEMI's Place in the Framework for Water Quality Monitoring

- Alpha & Omega
  - ✓ Sampling & analysis design, data quality, information quality, and method selection.
    - How to achieve DQOs and MQOs using the best method(s) for a specific monitoring project.
  - ✓ Data quality documentation used in monitoring reports.
    - Documenting the approach used to achieve DQOs and MQOs for data quality and information quality.

Future Enhancements

- **Field analytical methods** - these methods are being increasingly used to work smarter, faster and cheaper (promoted by EPA's Technology Innovation Office - TIO).
- User-friendly **DQO-based optional front end interface** (an expert system decision tree) to answer questions that people often do not know to ask.
  - ✓ Answers will serve as inputs to search NEMI for appropriate methods for user's specific needs.

Why Not Use Existing Summaries?

- The goal for NEMI is water methods comparison.
  - ✓ Other method summaries were developed for different reasons (EMMI for example, to provide accurate citations for use in regulatory programs' purposes).
- A state-of-the-art, Internet-accessible search engine and web-based query display system is desired.
  - ✓ Other methods summaries lack this combination of features.
- Normalized data (meta data) for precision, bias, cost, etc. are needed for methods comparison.
  - ✓ These data are lacking or not normalized in existing summaries.
- Links from summaries to full methods on the Internet.

How NEMI is Developed

- **MDCB** provides overall guidance and review of NEMI framework, content and functions.
- **NEMI Steering Committee** - representatives of different agencies and the private sector provides technical input and peer review of all major steps.
- **EPA Office of Water** with DynCorp and the USGS Oracle development staff developing NEMI.
- **Phase I** - NEMI populated with a small selected set of water analytical methods (107) to test it.
- **Phase II** - NEMI now is being populated with more methods including biological method summaries.

NEMI Information Sources

Method summaries from various sources:

- ✓ Environmental Protection Agency,
- ✓ U.S. Geological Survey,
- ✓ Department of Energy,
- ✓ American Society for Testing and Materials (ASTM),
- ✓ AOAC (formerly the Association of Official Analytical Chemists),
- ✓ Standard Methods, and
- ✓ Private Companies (for example, Hach)

NEMI Characteristics

Internet searchable and includes information on:

- ✓ **Analytes - chemical, radiochemical, and biological**
- ✓ **Instrumentation - key for analysis**
- ✓ **Media and matrices - water only now**
- ✓ **Interferences - what a chemist needs to know**
- ✓ **Sampling - container types and techniques**
- ✓ **Sample handling - preservation and storage**
- ✓ **Meta data - detection levels, accuracy & precision**
- ✓ **QA/QC requirements - use for methods selection and/or method modifications and data comparability.**
- ✓ **Relative cost - $ to $$$$**

How NEMI is Used

Search and compare information in NEMI by:

- ✓ **Chemical/Biological parameters**
- ✓ **Multiple chemicals**
- ✓ **Method**
- ✓ **Medium (only water methods now - others can be added later)**
- ✓ **Meta data (precision, accuracy, detection levels)**

In short, all of the information needed to compare methods and the quality of data they produce.

Examples of NEMI Use

- Examples of screen “shots” include:
  - ✓ NEMI Home Page Screen
  - ✓ Query Page - Option 2
    - List of Methods by Source - USGS Example
  - ✓ Query Page - Option 1
    - DDT Example - All Methods in NEMI for DDT
    - DDT Example - Specify Accuracy and Precision
  - ✓ Methods Summary Page
    - View All Other Analytes Applicable to Method
    - Link to Full Method Source

National Environmental Methods Index

PROTOTYPE - not for public release

NWQMC
NATIONAL WATER QUALITY MONITORING COUNCIL
Working Together for Clean Water

Welcome to the **prototype** National Environmental Methods Index (NEMI). The purpose of NEMI is to provide a mechanism to compare and contrast the performance and relative cost of analytical and field methods for environmental monitoring. This prototype has been developed in order to (a) test business rules for defining how methods are presented in order for users to make comparisons of critical fields of information and (b) to develop a web interface into the database to allow easy comparison of the methods in NEMI.

NEMI is being developed under the direction of the Methods and Data Comparability Board, a partnership of water-quality experts from Federal agencies, States, Tribes, municipalities, industry, and private organizations. The Methods Board is chartered under the National Water Quality Monitoring Council, whose mission since its charter in May 1997 is to coordinate and provide guidance on implementation of the voluntary, integrated, nationwide monitoring strategy.
Click here for a printable (.PDF format) fact sheet on NEMI.

NEMI allows you to select and compare methods based on a search by:

- Chemical/biological parameter
- Media (water, air, soil, other)
- Key words
- Metadata (precision, accuracy, relative cost, etc.)

Prototype Search Interface

- Option 1: Single analyte + metadata search. - search using analyte name and additional optional fields to narrow your search
  Search the analyte names database: Inorganics || Organics || Radiochemicals
- Option 2: General search. - - general search (search by category, keyword, source, etc. - - analyte name not required)

NEMI Database Information

- List of all methods in NEMI
- Data dictionary and business rules
- NEMI Field Definitions
- Data input forms - start here
- Links of Interest
- Send us your comments - - feedback form

Steering Committee Info

- Relative Cost Info: HTML || Excel
- Preferred Analyte Names: HTML || Excel

NEMI is currently funded by the U.S. Environmental Protection Agency and the U.S. Geological Survey, Water Resources Division.

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National Environmental Methods Index

PROTOTYPE WEB INTERFACE

Submit Query | Reset

General search of the NEMI database

Enter values for any or all of the parameters below

Select media — Any media (water, air, soil/sediment, other)

Select source — United States Geological Survey (USGS)

Select subcategory — Any category

Note: Keyword search will be added to this query so that users can query by analyte class, applicability, etc.

Option 2 Query Page

National Environmental Methods Index

PROTOTYPE WEB INTERFACE

Results of General Search

Number of methods: 12 **Source:** United States Geological Survey (USGS)

Media: % **Subcategory:** %

Method Number	Method Source	Method Name
I-1137-85	United States Geological Survey (USGS)	Cadmium In Water By Graphite Furnace Atomic Absorption Spectrometry
I-1300-85	United States Geological Survey (USGS)	Dissolved Cyanide In Water By Colorimetry With Pyridine-Pyrazolone
I-1472-85	United States Geological Survey (USGS)	Dissolved Metals In Water By Atomic Emission Spectrometry Using Induction-Coupled Plasma (Icp)
I-1586-85	United States Geological Survey (USGS)	Ph In Water By Electrometry Using A Glass-Electrode
I-2057-85	United States Geological Survey (USGS)	Dissolved Anions In Water By Automated Ion-Exchange Chromatography
I-3300-85	United States Geological Survey (USGS)	Total Cyanide In Water By Colorimetry With Pyridine- Pyrazolone
I-3561-85	United States Geological Survey (USGS)	Total Chemical Oxygen Demand In Water-Suspended Sediment By Dichromate Oxidation And Colorimetry
O-3104-83	United States Geological Survey (USGS)	Total Recoverable Organochlorine And Organophosphorus Compounds In Water By Gas Chromatography
O-3113-83	United States Geological Survey (USGS)	Total Recoverable Polynuclear Aromatic Hydrocarbons (Pna) In Water By High Performance Liquid Chromatography
O-3115-83	United States Geological Survey (USGS)	Total Recoverable Purgeable Organic Compounds In Water By Purge And Trap Gas Chromatography With A Mass Spectrometer
R1141	United States Geological Survey (USGS)	Radium-226, Dissolved, Radon Emanation Method
I-1338-85	United States Geological Survey (USGS)	Hardness In Water By Colorimetric Titration

Click on Any Method Number to View a Summary of that Method

NEMI Home

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National Environmental Methods Index

PROTOTYPE WEB INTERFACE

Search the methods database by analyte; narrow your search by related metadata. **Option 1 Query Pag**

You MUST enter something in the analyte field; if you want to search without supplying an analyte name go back and select Option 3. Click here to to search the analyte names database.

Submit Query Reset

You must enter a value for analyte name; all other fields are optional. Click on hyperlinks for field-specific information.

Enter Analyte name *Help* p,p'-DDT

Method Source *Help* Any source

Specify instrument *Help* Any instrument

Target detection level (DL) *Help*

DL Units *Help* Select units if DL specified

Note: if you specify a DL value you must select units.

Precision *Help* **(in percent relative standard deviation units)**

Accuracy *Help* **(in percent recovery units)**

Method Number *Help*

No Search Parameters Specified

National Environmental Methods Index

PROTOTYPE WEB INTERFACE

Analyte & metadata search Results

8 methods were found that match your search criterion

Click Method Number for method details; click on a heading to view the definitions file.

Method Details	Detection Level (DL)	DL Units	Accuracy	Accuracy Units	Precision	Precision Units	Relative Cost	Instrumentation
625	4.7	ug/L	78.8	% Recovery (Multilaboratory)	30.3	% RSD (Multilaboratory)	$$$$$	GCMS
6630 C	.01	ug/L	67	% Recovery (Multilaboratory)	13	% RSD (Multilaboratory)	unknown	GCECD
8081B	.71	ug/L	57	% Recovery (Single Laboratory)	10	% RSD (Single Laboratory)	unknown	CGCECD
8270D	N/A	ug/L	72.44	% Recovery (Multilaboratory)	63.84	% RSD (Multilaboratory)	$$$$$	CGCMS
990.06	.06	ug/L	N/A		14	% RSD (Multilaboratory)	unknown	CGCECD
O-3104-83	.01	ug/L	62.3	% Recovery (Single Laboratory)	19	% RSD (Single Laboratory)	unknown	GCECD
D5812-96	.12	ug/L	100.6	% Recovery (Multilaboratory)	15	% RSD (Multilaboratory)	unknown	CGCECD
6410 B	4.7	ug/L	72.44	% Recovery (Multilaboratory)	63.84	% RSD (Multilaboratory)	$$$$$	GCMS

Analyte name (click for synonyms): p,p'-DDT

Detection level: Select u

Three Types of Instruments Are Used Among All The Methods Listed

National Environmental Methods Index

PROTOTYPE WEB INTERFACE

Search the methods database by analyte; narrow your search by related metadata.

You MUST enter something in the analyte field; if you want to search without supplying an analyte name go back and select Option 3. Click here to to search the analyte names database.

Submit Query Reset

You must enter a value for analyte name; all other fields are optional. Click on hyperlinks for field-specific information.

Enter Analyte name *Help*: p,p'-DDT

Method Source *Help*: Any source

Specify instrument *Help*: Any instrument

Target detection level (DL) *Help*:

DL Units *Help*: Select units if DL specified

Note: if you specify a DL value you must select units.

Precision *Help*: 25 **(in percent relative standard deviation units)**

Accuracy *Help*: 70 **(in percent recovery units)**

Method Number *Help*:

Typical Accuracy and Precision Parameters

National Environmental Methods Index

PROTOTYPE WEB INTERFACE

Analyte & metadata search Results

2 methods were found that match your search criterion

Click Method Number for method details; click on a heading to view the definitions file.

Method Details	Detection Level (DL)	DL Units	Accuracy	Accuracy Units	Precision	Precision Units	Relative Cost	Instrumentation
990.06	.06	ug/L	N/A		14	% RSD (Multilaboratory)	unknown	CGCECD
D5812-96	.12	ug/L	100.6	% Recovery (Multilaboratory)	15	% RSD (Multilaboratory)	unknown	CGCECD

Analyte name (click for synonyms): p,p'-DDT

Detection level: Select u

Source Org.: %

Accuracy: 70 **Precision:** 25

ethod Details

Report run on: May 11, 2001 10:12 AM

Method Number **Method Source**

D5812-96 American Society for Testing and Materials

Method Name Organochlorine Pesticides In Water By Capillary Column Gc/Ecd

Brief Method Summary

I. Scope: This method allows for determination of organochlorine pesticides in water: II. Summary of Test Method: Sample volume and initial sample treatment: Transfer the sample to a 2-L separatory funnel, add 50 mL of phosphate buffer solution, and adjust the pH to 7 with sodium hydroxide or sulfuric acid solution. Add 100 g of NaCl mix. Extract the sample 3 times with 60 mL of methylene chloride. Dry the combined extracts by passage through a column of anhydrous sodium sulfate and concentrate to 2 mL in a Kuderna-Danish concentrator. Exchange to methyl-tert-butyl ether (MTBE). Concentrate the MTBE to 1 mL and adjust to a final volume of 5 mL. I. Determinative step: A 2 L aliquot of extract is injected into a gas chromatograph. The analytes are separated on a 30-m x 0.25-mm i.d. DB-5 fused silica capillary column and detected with an electron capture detector (ECD). II. Cleanup: A cleanup procedure for sulfur removal is given and cleanups using Florisil, GPC, and partitioning with acetonitrile are referenced.

QA/QC Requirements

MINIMUM OF IDLC, IPC, LRBS, LFM; IF AVAILABLE - QCSS

Applicable Conc Range

NONE GIVEN.

Sample Handling

COLLECT A 1-L SAMPLE IN A GLASS BOTTLE AND COOL TO 4 ± 2 C UNTIL EXTRACTION. ADD 2 ML OF SODIUM THIOSULFATE SOLUTION (40 MG/ML) TO REMOVE RESIDUAL CHLORINE, IF PRESENT, AND ADD 1 ML OF MERCURIC CHLORIDE SOLUTION (10 MG/ML) TO PREVENT BIOLOGICAL DEGRADATION, IF BIOLOGICAL ACTIVITY IS PRESENT. EXTRACT THE SAMPLE WITHIN 7 DAYS OF COLLECTION AND ANALYZE THE WITHIN 14 DAYS OF EXTRACTION.

Max Holding Time

7 DAYS (PRIOR TO EXTRACTION) 14 DAYS (AFTER EXTRACTION)

Sample Prep Methods

Source Citation Name

ASTM Volume 11.02 (1999)

Download PDF files for EPA Methods or Link to Home Page of Commercial Method Source

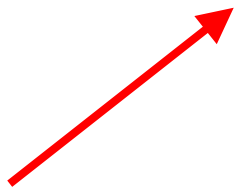
Click to View All Analytes of the Method

Click to View Method Source

National Environmental Methods Index

PROTOTYPE WEB INTERFACE

Method number: **D5812-96** provides analyses for **28** analytes, listed below.



Analyte Name
Trifluralin
trans-Permethrin
Propachlor
alpha-Chlordane
gamma-Chlordane
Chlorobenzilate
Chloroneb
Chlorothalonil
DCPA
4,4'-DDD
4,4'-DDE
4,4'-DDT
Dieldrin
Endosulfan-I
Endosulfan-II
Endrin
Endrin aldehyde
Etridiazole
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
p,p'-Methoxychlor
cis-Permethrin
Lindane
delta-BHC
Aldrin
alpha-BHC
beta-BHC

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Live Demonstration

- We'll have live demonstrations of NEMI tomorrow at 11:15 a.m. (and after adjournment today).

  ✓ Come and experiment with the program on-line.

  ✓ Search on your favorite pollutants.

  ✓ Compare method summary information from various sources.